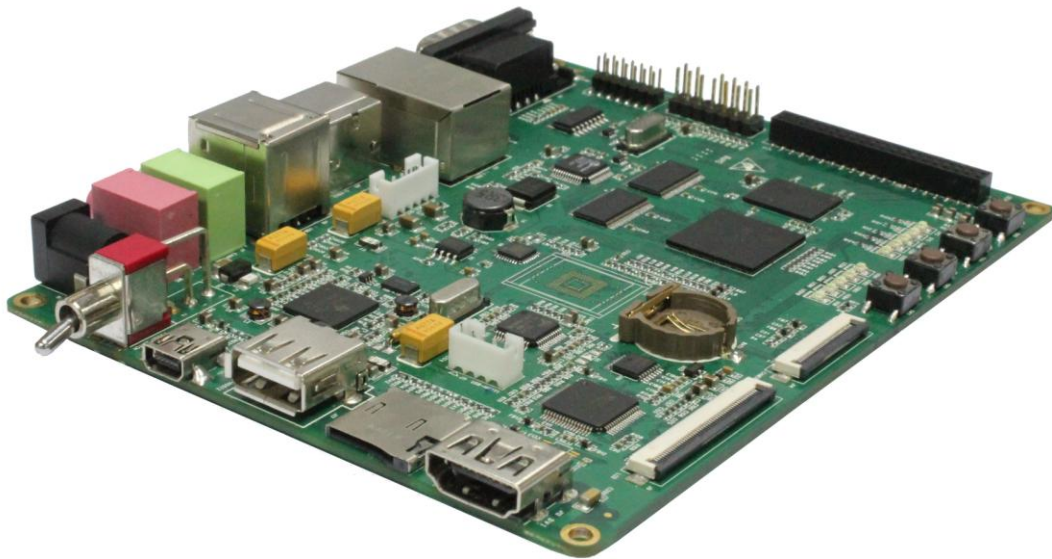


DM3730-EVK

Integrated with LCD, USB, CCD/COMS, Audio input/output, S-video, Ethernet, Serial port,
TF card interface based on 32-bit microcontroller



Quick Operation Manual

Version update records:

Version	Date	Description
1.0	2011.7.20	Original version
1.1	2011.8.5	Parts of contents have been amended to avoid ambiguity

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1. Overview

The primary purpose of this Document is to enable the user to know the development environment of software and hardware of DM3730-EVK quickly, and help the user to get into the product development or learning stage faster.

1) This Document mainly has the following parts:

- a) How to use documents and CD data quickly;
- b) Description on hardware components of the evaluation board and suite configuration;
- c) Description on default configuration of software and hardware of the evaluation board;
- d) Quick establishment of the development environment of the evaluation board;
- e) Handover and quick use of Linux/wince/Android operating systems.

2) Factory default configuration of DM3730-EVK evaluation board

- a) Configuration of hardware
 - DM3730-EVK default factory configuration: no welding, 2GB, 4-bit, iNAND, no RTC cell.
- b) Factory-setting parameters of software
 - DM3730-EVK evaluation board preferably boots from TF card by default, and boots from NANDFLASH if no TF card is inserted.
 - NANDFLASH is installed by default with linux2.6.32 operating system and 4.3-inch screen driver.
 - TF card is installed by default with winCE6.0 operating system and 4.3-inch screen driver.

3) DM3730-EVK optional modules list:

Modules	Linux	Android	WinCE	Notes
VGA8000	YES*	NO	YES*	Provided with CD-ROM on Development board
WF8000-U	YES*	YES*	YES#	Provided with CD-ROM Separately
GPRS8000-S	YES*	NO	YES*	Download here
GPS8000-S	YES*	YES*	YES*	Download here
CAM8000-A	YES*	NO	YES*	Provided with CD-ROM on Development board
CAM8000-D	YES#	YES#	YES*	Provided with CD-ROM Separately
CAM8100-U	YES*	YES*	YES#	Provided with CD-ROM Separately
CDMA8000-U	YES*	YES*	YES#	Download here
WCDMA8000-U	YES*	YES*	YES#	Download here
COM8010-S	YES*	YES*	NO	Provided with CD-ROM Separately

* = Provided with Source Code

= Not Provided with Source Code

1.1 Getting Started Quickly

This section will tell the user how to understand and use DM3730-EVK better and faster through this DM3730-EVK Quick Operation Manual. For more information please refer to the listed document and location.

For hardware development:

Hardware system	Introduce CPU, expanded chip and hardware interface	User Manual->2 Hardware System
CPU Datasheet	Know principle and configuration of DM37x/AM37x	CD->\HW design\datasheet\CPU\
Schematic diagram of DM3730-EVK	Know hardware principle of DM3730-EVK	CD->\HW design\schematic
Dimensional drawing of DM3730-EVK	Refer to the actual length and height of DM3730-EVK to bring convenience for opening die	User Manual->Appendix->Appendix One

For software development:

Establish testing environment	To connect with external hardware devices, set serial port terminals and boots the system	Quick Operation Manual->2 Hardware Settings 3 Software Settings
Test functionality of interface	Test the interface of the board carrier through the operating system	User Manual ->3.8.1 Testing
DEMO demonstration	Establish a DEMO demonstration system (Android, DVSDK)	User Manual->3.8.2.1 Android Demonstration System 3.8.2.2 DVSDK Demonstration System
Establish developing and compilation environment	Linux developing and compilation environment	User Manual -> 3.4.1 Establishment of Developing Environment
	WinCE developing and compilation environment	User Manual->4.4.1 Installation of Compilation Tool 4.4.2 Establishment of Developing Environment
Recompile system image	Recompile Linux system image	User Manual->3.4.2 System Compilation
	Recompile WinCE system image	User Manual->4.4.3 Sysgen & BSP Compilation
Software development	Refer to introduction of Linux driver and related driver	User Manual->3.5 Driver Introduction

	development process	3.6 Driver Development
	Refer to introduction of WinCE driver and related driver development process	User Manual -> 4.4.4 Driver Introduction

For marketing:

Hardware system	CPU feature, board carrier interface data	User Manual->2 Hardware System
About Linux / WinCE software	Know basic Linux software components and features, and purpose of compilation tool	User Manual->3.2 Software Resources 3.3 Software Features
	Know basic WinCE software components and features, and purpose of compilation tool	User Manual->4.2 Software Resources 4.3 Features
Dimensional drawing of DM3730-EVK	Refer to the actual length and height of DM3730-EVK to bring convenience for opening die	User Manual->Appendix->Appendix One
DEMO demonstration	Establish a DEMO demonstration system (Android, DVSDK)	User Manual->3.8.2.1 Android Demonstration System 3.8.2.2 DVSDK Demonstration System

For learning personnel:

It is suggested to browse each section in each chapter of this Manual in order.

1.2 Development suite

DM3730-EVK provides two configuration modes: Standard Configuration and Full Configuration (4.3-inch or 7-inch), the specific accessories for configuration are as follows:

Standard Configuration

- DM3730-EVK evaluation board
- 2GB TF card
- Serial port line (DB9-DB9)
- 5V@2A power adapter
- USB main data line (A type male to mini-B type male)
- USB slave data line (A type female to mini-A type female)
- Crossover cable

- HDMI to DVI-D data line
- S-Video cable

Full configuration

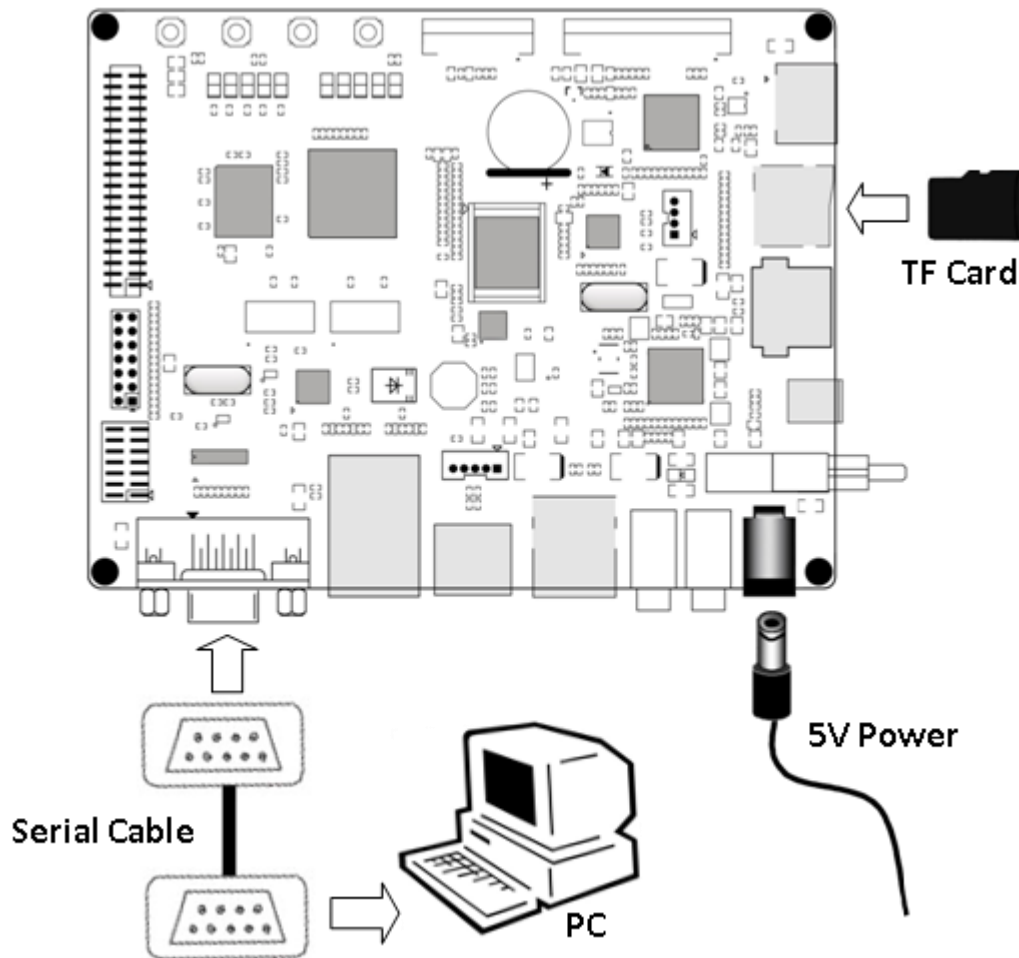
- Standard configuration of DM3730-EVK evaluation suite
- 4.3-inch LCD display screen or 7-inch display screen (with touch screen)

Assorted DVD CD

- DM3730-EVK Quick Operation Manual
- DM3730-EVK User Manual
- Schematic Diagram of DM3730-EVK Hardware, Board Carrier Chip Datasheet
- Development Kit of DM3730-EVK Software (Linux/WinCE/Android)

2 Quick establishment of development environment

2.1 Establishment of hardware environment



Please establish the hardware environment according to the following steps:

1) Connect serial port for communication

Use serial cable to connect the debugger serial port and PC serial port of DM3730-EVK.

2) Connect TFT-LCD

Connect your 4.3-inch/7-inch TFT-LCD to the TFT-LCD interface J9.

3) Insert TF card

If you want to boot and operate WINCE6.0 operating system from TF card, please insert the TF card into the TF card slot J3 of DM3730-EVK.

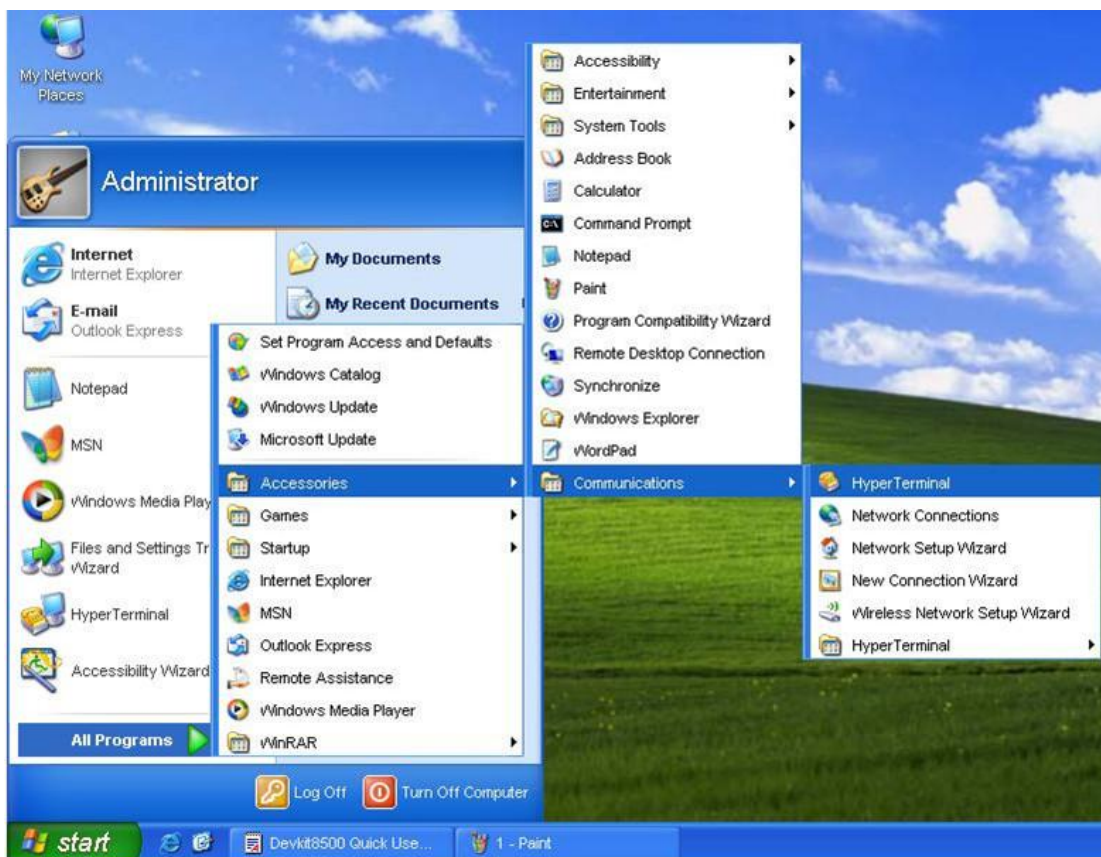
- 4) Connect the 5V power adapter to the evaluation board

2.2 Establishment of Software Environment

2.2.1 Preparation of Windows XP system environment

Before DM3730-EVK boot-up, you need to establish a HyperTerminal on PC; follow the below process in order to setup Hyper Terminal connection:

- 1) Windows XP -> Start -> All Programs -> Accessories -> Communication -> Hyper Terminal. Find the HyperTerminal, as shown below:



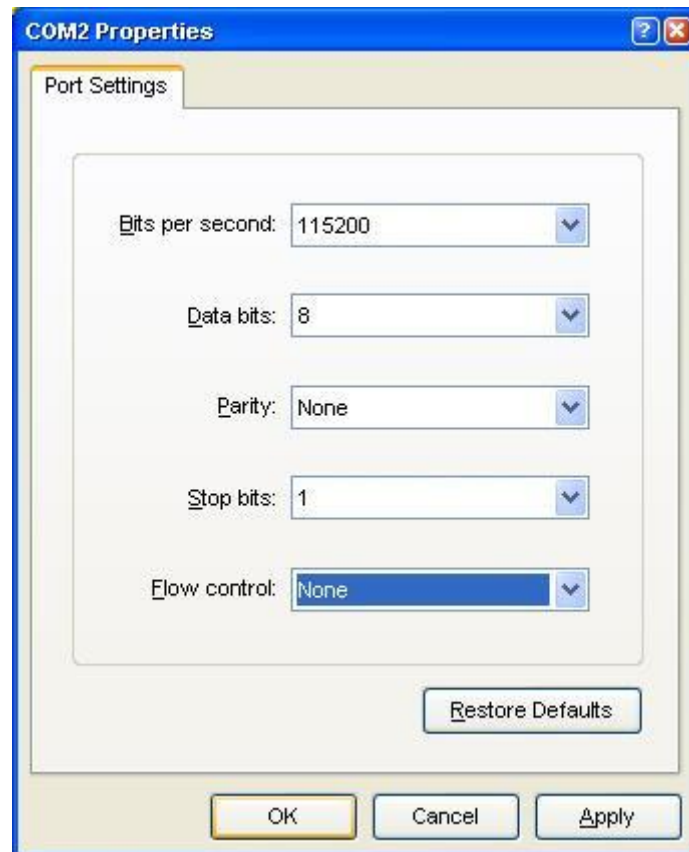
- 2) Establish HyperTerminal connection and give commands:



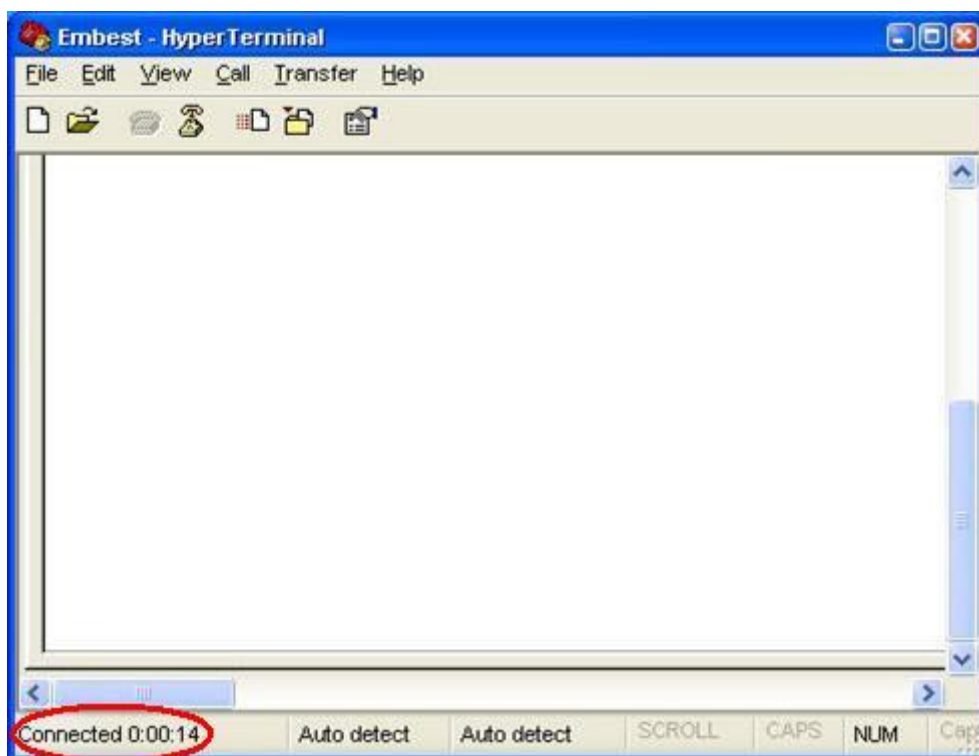
- 3) Select the specific serial port from the list as per your computer COM port configuration:



- 4) Set parameters for serial port connection as follows:



- 5) So we have successfully established a Hyper Terminal connection with PC serial port:



2.2.2 Notes of operating system image file

- Skip this step if you have purchased 4.3-inch touch screen.

- If you have purchased 7-inch touch screen, you need to reprogram the kernel image file using specified method which has been explained in section 3 “Handover and Quick Use of Operating system”.

So far, we have successfully establishment software and hardware for the system, the user now can turn on the power switch to start the development on DM3730-EVK.

3 Handover and quick use of operating system

DM3730-EVK supports three operating systems, Linux 2.6.32, WINCE6.0 and Android. This chapter mainly introduces how to handover among different operating systems and how to use from TF card and NANDFLASH.

3.1 Quick operation of Linux system

3.1.1 Boot-up from TF card

Assorted TF card of DM3730-EVK is installed by default with WINCE6.0 + 4.3-inch screen driver.

Follow the following steps to

Boot-up from TF card

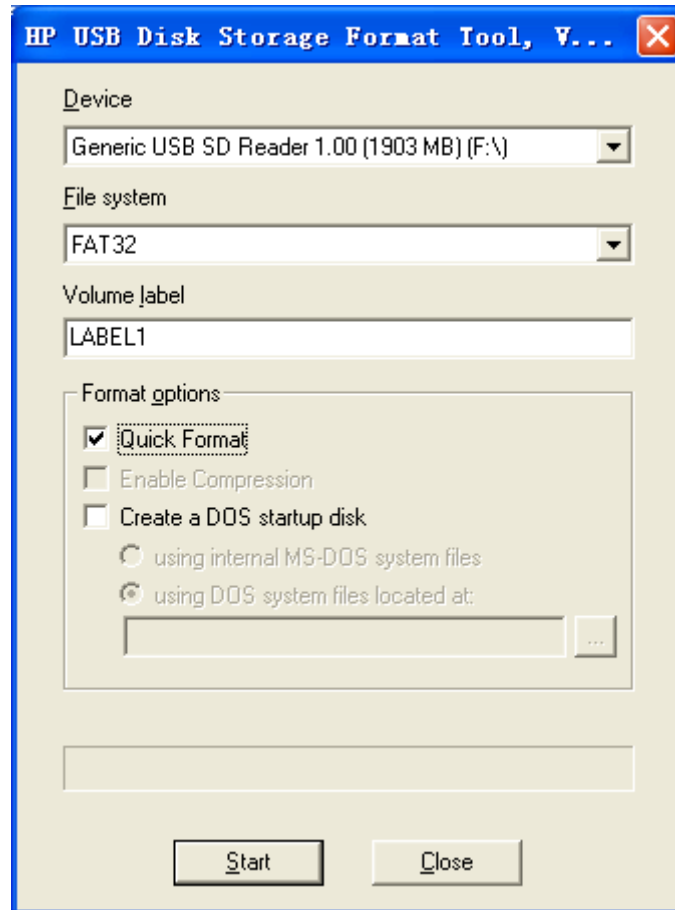
1) Format TF

We recommend to use HP USB Disk Storage Format Tool 2.0.6 to format the Tf card, you can download this tool from this link:

<http://www.embedinfo.com/english/download/SP27213.exe>

Follow the following steps to format TF card:

- a) Insert TF card into the PC card reader.
- b) Open HP USB Disk Storage Format Tool, a new format window will pop up as below:



- c) Select "FAT32" format.
- d) Click "Start".
- e) Wait to finish formatting, once completed click "OK".



Please do not use this formatting tool if you use a TF card with partitions, as it will clear partitions of the TF card.

2) Load kernel image file

Copy all the files from the CD under the folder linux/image to the TF card, and **rename ulimage_xx as ulimage** according to your display device LCD (4.3", 7") or VGA.



ulimage_xx is subject to LCD used by the user, specifically, (4.3, 7, VGA) .

3) Enter into the system

After inserting the TF card in the slot, connect the debugger serial port and turn ON the power to boot, following information will be displayed:

60

Texas Instruments X-Loader 1.47 (Sep 27 2011 - 15:53:45)

DM3730_EVK xM Rev A

Starting X-loader on MMC

Reading boot sector

1153680 Bytes Read from MMC

Starting OS Bootloader from MMC...

Starting OS Bootloader...

U-Boot 2010.06-rc1-svn (Sep 27 2011 - 14:54:40)

OMAP34xx/35xx-GP ES2.1, CPU-OPP2 L3-165MHz

DM3730_EVK board + LPDDR/NAND

I2C: ready

DRAM: 512 MiB

NAND: 512 MiB

*** Warning - bad CRC or NAND, using default environment

In: serial

Out: serial

Err: serial

DM3730_EVK xM Rev A

Die ID #065400029e3800000168263d0600900a

Net: dm9000

Hit any key to stop autoboot: 0

mmc1 is available

reading boot.scr

```
** Unable to read "boot.scr" from mmc 0:1 **

reading ulmage

2551588 bytes read
reading ramdisk.gz

7686374 bytes read
Booting from mmc ...

## Booting kernel from Legacy Image at 80300000 ...

   Image Name:   Linux-2.6.32
   Image Type:   ARM Linux Kernel Image (uncompressed)
   Data Size:    2551524 Bytes = 2.4 MiB
   Load Address: 80008000
   Entry Point:  80008000
   Verifying Checksum ... OK
   Loading Kernel Image ... OK

OK

Starting kernel ...

Uncompressing
Linux.....
..... done, booting the kernel.

Linux version 2.6.32 (luofc@TIOP) (gcc version 4.4.0 (GCC) ) #1 Mon Mar 14 10:08:34 CST
2011
.....
.....

Remounting root file system...

mount: mounting /dev/root on / failed: Invalid argument
mount: mounting /dev/root on / failed: Invalid argument
root: mount: mounting rootfs on / failed: No such file or directory
root: mount: mounting usbfs on /proc/bus/usb failed: No such file or directory
```

```

Setting up IP spoofing protection: rp_filter.
Configuring network interfaces... udhcpc (v1.11.3) started
Sending discover...
udhcpc: sendto: Network is down
Sending discover...
udhcpc: sendto: Network is down
INIT: Entering runlevel: 5
Starting syslogd/klogd: done
.-----
|      |               .-
|  |  |-----|-----|  |-----| | | | | | | | | | |
|      |  |  |__  |  --'  '-|  .-'  |      |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|'-----'|  |-----|  |-----|
          -'  |
          '---'

The Angstrom Distribution DM3730_EVK ttyS2
Angstrom 2008.1-test-20090127 DM3730_EVK ttyS2
DM3730_EVK login: (Just input "root")

```

3.1.2 Boot-up from NAND Flash

DM3730-EVK evaluation board default NANDFLASH is installed with linux + 4.3-inch screen display. it can be booted without connecting TF card once it's powered on or reset.

Follow the steps to copy new image from TF card to NandFlash to boot-up from NANDFLASH:

1) Format TF card

Please refer to section 3.1.1 steps for TF card formatting.

2) Load kernel image file

Copy x-load.bin.ift_for_NAND, flash-uboot.bin, ulmage_xx, ubi.img image files from the CD under the folder linux/image to the TF card, and rename ulmage_xx as ulmage according to your display device LCD (4.3", 7") or VGA.

3) Update image file

You can update the NandFlash boot-up image with the help of “u-boot” using TF card. Insert the TF card having system images into the development board slot. Now power ON to boot, press any key to enter into the uboot during second read and execute the following steps.

The boot-up interface shown below:

```
Texas Instruments X-Loader 1.47 (Sep 27 2011 - 15:53:45)
DM3730_EVK xM Rev A
Starting X-loader on MMC
Reading boot sector

1153680 Bytes Read from MMC
Starting OS Bootloader from MMC...
Starting OS Bootloader...

U-Boot 2010.06-rc1-svn (Sep 27 2011 - 14:54:40)

OMAP34xx/35xx-GP ES2.1, CPU-OPP2 L3-165MHz
DM3730_EVK board + LPDDR/NAND
I2C:  ready
DRAM:  512 MiB
NAND:  512 MiB
*** Warning - bad CRC or NAND, using default environment
In:    serial
Out:   serial
Err:   serial
DM3730_EVK xM Rev A
Die ID #22e800211e3000000158ed8408008020
Net:   dm9000

Hit any key to stop autoboot:  0  (Press any key to enter the u-boot)
```

DM3730_EVK # **run updatesys**

NAND erase: device 0 whole chip

Skipping bad block at 0x1c9c0000

Erasing at 0x1ffe0000 -- 100% complete.

OK

mmc1 is available

reading x-load.bin.ift_for_NAND

11000 bytes read

HW ECC selected

NAND write: device 0 offset 0x0, size 0x2af8

12288 bytes written: OK

reading flash-uboot.bin

230764 bytes read

SW ECC selected

NAND write: device 0 offset 0x80000, size 0x3856c

231424 bytes written: OK

reading ulmage

2561868 bytes read

SW ECC selected

NAND write: device 0 offset 0x280000, size 0x27174c

2562048 bytes written: OK

reading ubi.img

7602176 bytes read

```
SW ECC selected
```

```
NAND write: device 0 offset 0x680000, size 0x740000
```

```
7602176 bytes written: OK
```

```
DM3730_EVK #
```

Once completed, led lamp sys on the board will flicker to prompt successful programming, otherwise programming failed. After successful updating, pull the TF card out, and reboot the evaluation board to boot the system from NANDFLASH.

In case of failed programming, please execute the above mentioned steps again.

3.2 Quick operation of WinCE system

TF card in the DM3730-EVK evaluation board suite comes with default WINCE6.0 + 4.3-inch screen driver.

3.2.1 Boot-up from TF card

1) Format TF card

Please refer to section 3.1.1 steps for TF card formatting.

2) Load kernel image file

- All the images are located under sub-folder WinCE_6/image, lcd_800x480, lcd_480x272 and DVI_1280x720. You need to select respective image according to your display device, lcd_480x272 for LCD 4.3", lcd_800x480 for LCD 7", and DVI_1280x720 for VGA.
- Copy **MLO**, **EBOOTSD.nb0** and **NK.bin** image files from the folder to the TF card.

3) Update image file

Insert TF card in to the development kit slot and reboot the system. At this time, the system boots from TF card. The HyperTerminal will output boot print information and display the following contents:

```
60
Texas Instruments Windows CE SD X-Loader for EVM 3730
Built Mar 23 2011 at 08:31:15
Version 6.15.00
open ebootsd.nb0 file
Init HW: controller RST
SDHC: 1 bit mode
SDCARD: requested speed 1000000, actual speed 1000000
```

Using 4 bit mode
SDHC: 4 bit mode
SDCARD: requested speed 25000000, actual speed 24000000
read eboot.sd.nb0 file
jumping to eboot.sd image

Microsoft Windows CE Bootloader Common Library Version 1.4 Built Mar 22 2011 18:45:08

Texas Instruments Windows CE EBOOT for Mistral OMAP EVM, Built Mar 23 2011 at
08:31:11

EBOOT Version 1.1, BSP 6.15.00

TI DM3730 Version 0x2b89102f (unknown)
TPS659XX Version 0x10 (ES1.1)
System ready!
Preparing for download...
INFO: Predownload....
WARN: Boot config wasn't found, using defaults
INFO: SW4 boot setting: 0x2f

>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<

Hit space to enter configuration menu 1...

Init HW: controller RST

SDHC: 1 bit mode

SDCARD: requested speed 1000000, actual speed 1000000

Using 4 bit mode

SDHC: 4 bit mode

SDCARD: requested speed 25000000, actual speed 24000000

BL_IMAGE_TYPE_BIN

Download file information:

[0]: Address=0x80101000 Length=0x022a14e4 Save=0x80001000

Download file type: 1(You may wait for a longer time here as the system boots from TF
card)

rom_offset=0x0.

ImageStart = 0x80101000, ImageLength = 0x22A14E4, LaunchAddr = 0x8010F82C

Completed file(s):

[0]: Address=0x80101000 Length=0x22A14E4 Name="" Target=RAM
ROMHDR at Address 80101044h

Launch Windows CE image by jumping to 0x8000f82c...

Windows CE Kernel for ARM (Thumb Enabled) Built on Oct 20 2009 at 18:39:19

OAL: CPU revision 0xffffffff

OAL: CPU L2 Aux register 0x400042

--- High Performance Frequency is 32768 khz---

Here system has entered into the WinCE calibration interface, after calibration the system will display WinCE desktop interface.

3.2.2 Boot-up from NAND Flash

1) Format TF card

Please refer to section 3.1.1 steps for TF card formatting.

2) Load kernel image file

- All the images are located under sub-folder WinCE_6/image, lcd_800x480, lcd_480x272 and DVI_1280x720. You need to select respective image according to your display device, lcd_480x272 for LCD 4.3", lcd_800x480 for LCD 7", and DVI_1280x720 for VGA.
- Copy **MLO**, **EBOOTSD.nb0** and **NK.bin** image files from the folder to the TF card and rename EBOOTNAND.nb0 as EBOOTSD.nb0.

3) Update image file

- Insert TF card into the development kit slot and reboot the system. At this time, the system boots from TF card. The HyperTerminal will output boot print information, you can press [SPACE] to enter into the EBOOT menu. There is an automatic update key [k] in the menu, which can update XLDR, EBOOT, logo and NK images automatically, or you can update one by one according as per following steps:
- Press [5] to enter the Flash administration menu.
- Respectively press [a], [b] and [c] to write XLDR, EBOOT and NK images.
- Then press [0] to return to main menu, and respectively press [2], [4], [7] and [y] to change the boot devices.

Pull out TF card and then reboot the system. At this time, the system will boot from NAND Flash.

3.3 Quick operation of Android system

The user can program Android to the NAND Flash of the development board by using the following steps.

Note: At present, Android only supports boot-up from NAND Flash.

1) Format TF card

Please refer to section 3.1.1 steps for TF card formatting

2) Load kernel image file

Copy all files from CD under the folder /linux/demo/Android/image to the TF card, and rename ulmage_xx as ulmage according to your display device LCD (4.3", 7") .



At present, Android does not support VGA display mode.

3) Update image file

Insert the TF card in to the development board slot, connect the debugging serial port and turn ON the power to boot, information displayed as follows;

60

Texas Instruments X-Loader 1.47 (Sep 20 2011 - 16:18:31)

DM3730_EVK xM Rev A

Starting X-loader on MMC

Reading boot sector

1153712 Bytes Read from MMC

Starting OS Bootloader from MMC...

Starting OS Bootloader...

U-Boot 2010.06-rc1-svn (Sep 27 2011 - 14:57:19)

OMAP34xx/35xx-GP ES2.1, CPU-OPP2 L3-165MHz

DM3730_EVK board + LPDDR/NAND

I2C: ready

DRAM: 512 MiB

NAND: 512 MiB

*** Warning - bad CRC or NAND, using default environment

In: serial

Out: serial

Err: serial

DM3730_EVK xM Rev A

Die ID #3a7e00229e3800000168263d0402302f

NAND erase: device 0 whole chip

Erasing at 0x1ffe0000 -- 100% complete.

OK

mmc1 is available

reading x-load.bin.ift_for_NAND

10892 bytes read

HW ECC selected

NAND write: device 0 offset 0x0, size 0x2a8c

12288 bytes written: OK

reading flash-uboot.bin

1152260 bytes read

SW ECC selected

NAND write: device 0 offset 0x80000, size 0x119504

1153024 bytes written: OK

reading ulmage

2572792 bytes read

SW ECC selected

NAND write: device 0 offset 0x280000, size 0x2741f8

2574336 bytes written: OK

reading ubi.img **(You may wait for a longer time here as the system boots from TF card)**

79036416 bytes read

SW ECC selected

NAND write: device 0 offset 0x680000, size 0x4b60000

79036416 bytes written: OK

Once finished, led lamp sys on the board will flicker to prompt the successful programming, at this time pull out the TF card, turn power on and boot again to enter into the Android operation system.

Customer Service

Please contact Premier Farnell local sales and customer services staffs for the help.

Website: <http://www.farnell.com/>

Technical Support

Please contact Premier Farnell local technical support team for any technical issues through the telephone, live chat & mail, or post your questions on the below micro site, we will reply to you as soon as possible.

Centralized technical support mail box: knode_tech@element14.com

Community: http://www.element14.com/community/community/knode/dev_platforms_kits

Please visit the below micro site to download the latest documents and resources code:

http://www.element14.com/community/community/new_technology/at91sam9g45-evk

Notes

This board was designed by element14's design partner- Embest, you can contact them to get the technical support as well.

Marketing Department:

Tel: +86-755-25635656 / 25636285

Fax: +86-755-25616057

E-mail: market@embedinfo.com

Technical Support:

Tel: +86-755-25503401

E-mail: support@embedinfo.com

URL: <http://www.armkits.com>